

British Isles. The pressure was also high over the British Isles from the 2d to 4th and 28th to 30th.

The month opened with a severe storm central south of Newfoundland, where the pressure fell to about 29.00 (736), and northwest gales of hurricane force were encountered. By the 2d this storm had moved east of the Grand Banks, and a second storm had advanced from the Saint Lawrence Valley to a position south of Newfoundland. By the 3d the storms had united and occupied mid-ocean north of the 50th parallel, where the pressure continued low during the 4th, after which the storm-center disappeared north of the region of observation. During the 5th low area I passed eastward over Newfoundland, with northwest gales of force 11 to 12 in the trans-Atlantic tracks between the 55th and 65th meridians during the early morning. By the 6th this storm had passed northeastward beyond the region of observation.

Reports of the 8th showed the development of a storm of marked energy east of the Banks of Newfoundland, where gales of hurricane force were encountered during that date. Reports of that date also indicated the presence of a disturbance southeast of the Azores. On the 9th 3 well-defined storms appeared, one, low area III, passed southeastward south of Newfoundland, one was central south of the Grand Banks, and the third occupied the ocean south-southeast of the Azores. By the 10th low area III had passed south-eastward and united with the storm central south of the Grand Banks, and the storm southeast of the Azores had apparently moved eastward. From the 11th to the 13th low area III occupied the ocean west of the Azores. By the 14th this storm had moved northeastward to about the 40th parallel, and from the 15th to the 18th was central north of the Azores, where it was attended by hard gales. By the 19th this storm had advanced to the British Isles.

The night of the 15th low area V moved eastward south of Nova Scotia, and by the morning of the 16th had apparently moved rapidly eastward and united with the storm which occupied mid-ocean. The morning of the 17th a storm of considerable strength appeared off the south Atlantic coast, where northwest gales of force 9 to 11 were encountered in the early morning. Moving northeastward, this storm reached the 40th parallel the morning of the 18th, and during the 19th passed northeastward over Newfoundland, attended during its passage south of Newfoundland on the 18th by west to north gales of force 10. On the 21st a storm of slight energy appeared over mid-ocean, from which region it moved slowly southeastward with an apparent increase of strength, and disappeared in the direction of the Mediterranean Sea by the 25th. During the 23d low area VI disappeared north of Newfoundland. On the 27th a storm of slight energy ap-

peared south of Newfoundland, from which position it moved slowly eastward, and at the close of the month was central northeast of the Banks of Newfoundland.

OCEAN ICE IN APRIL.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for April during the last 11 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
April, 1883.....	40 49	52 06	April, 1883.....	48 00	43 00
April, 1884.....	41 26	48 46	April, 1884.....	45 25	43 34
April, 1885.....	41 40	49 50	April, 1885.....	44 10	39 41
April, 1886.....	40 51	46 39	April, 1886.....	47 43	30 11
April, 1887.....	40 02	50 04	April, 1887.....	48 00	38 18
April, 1888.....	41 33	50 00	April, 1888.....	47 40	49 00
April, 1889.....	43 57	50 20	April, 1889.....	47 16	43 11
April, 1890.....	40 00	49 40	April, 1890.....	47 26	35 42
April, 1891.....	40 01	48 24	April, 1891.....	45 33	43 32
April, 1892.....	42 46	49 37	April, 1892.....	48 58	44 27
April, 1893.....	42 28	50 14	April, 1893.....	46 50	46 05
Mean.....	41 25	49 37	Mean.....	47 00	41 31

* Isolated iceberg.

The limits of the region within which icebergs or field ice were reported for April, 1893, are shown on Chart I by ruled shading. The southernmost ice reported, small patches of field ice, observed on the 21st in the position given, was about 1° north of the average southern limit, and the easternmost ice reported, small bergs on the 26th in the position given, was about 4½° west of the average western limit of ice for April. No ice was reported during the first half of the month, and that noted at intervals from the 17th to the 29th was encountered near the east edge of the Banks of Newfoundland.

OCEAN FOG FOR APRIL.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. East of the 55th meridian fog was reported on 14 dates; between the 55th and 65th meridians on 19 dates; and west of the 65th meridian on 10 dates. East of the 55th and west of the 65th meridians the dates of occurrence of fog corresponded in number with the average for April for the last 5 years; between the 55th and 65th meridians the number of foggy days numbered 9 greater than the average. The occurrence of fog along the steamship tracks west of the 40th meridian and at stations of the Weather Bureau on the middle Atlantic and New England coasts generally attended the approach or passage of general storms.

TEMPERATURE OF THE AIR (expressed in degrees Fahrenheit).

The distribution of mean temperature over the United States and Canada for April, 1893, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the temperature is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in the Colorado Desert,

Cal., and over extreme southern Florida, where it was above 75, and the mean values were above 70 in Florida, southern Georgia, southern Mississippi, southern Louisiana, central and southern Texas, and in the Gila and lower Colorado valleys. South of a line traced from North Carolina to extreme northwestern Texas, thence to extreme southern New Mexico, thence to extreme southern Nevada, and thence to extreme south-central California the mean temperature was above 60. The lowest mean temperature was noted at mountain stations in Colorado, and north of a line traced from extreme northern upper Michigan over northern Minnesota and northeastern North Dakota, where it was below 40, and the mean readings were below 40 north of a line traced from the middle New England coast to western South Dakota, thence to north-central New Mexico, and thence irregularly northwestward to

northern Idaho. The mean temperature was also below 40 in the Sierra Nevada Mountains in eastern California.

DEPARTURE FROM NORMAL TEMPERATURE.

In the Atlantic coast states south of Maryland and thence westward over Texas and southern New Mexico the month was warmer than usual; elsewhere the mean temperature was below the normal. In central Texas the departure above the normal temperature was 4 to 6, and it was 4 to 5 over a great part of the south Atlantic states. The month was 2 to 4 warmer than usual generally over the Southern States east of southeastern New Mexico. The most marked departure below the normal temperature was noted over the northern part of the country from Minnesota to the valley of the Columbia River, where the mean readings were 6 to 8 lower than usual. The month was 4, or more, colder than usual from the extreme upper Mississippi valley to the central valleys of California and the north Pacific coast.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for April for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for April, 1893; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for April during the period of observation and the years of occurrence:

State and station.	(1) Normal for the month of April.	(2) Length of record.	(3) Mean for April, 1893.	(4) Departure from normal.	(5) Extreme monthly mean for April.			
					Highest.	Year.	Lowest.	Year.
<i>Arizona.</i>	°	Years	°	°	°		°	
Fort Apache	52.5	21	51.4	- 1.1	59.5	1879	47.5	1884
Fort Mohave	70.8	22	69.7	- 1.1	77.1	1881	62.2	1891
Whipple Barracks	51.2	21	48.4	- 2.8	61.8	1876	45.4	1884
<i>Arkansas.</i>								
Keesee Ferry	61.8	11	61.0	- 0.8	65.3	1888	56.7	1884
<i>California.</i>								
Fort Bidwell	47.1	22	40.0	- 7.1	55.9	1881	40.0	1893
Riverside	60.4	11	60.7	+ 0.3	63.8	1885	57.8	1891
<i>Colorado.</i>								
Las Animas	51.2	11	52.2	+ 1.0	56.7	1888	46.2	1884
<i>Florida.</i>								
Merritts Island	71.8	11	74.5	+ 2.7	75.4	1883	67.0	1886
<i>Georgia.</i>								
Forsyth	65.1	19	69.4	+ 4.3	69.4	1893	61.0	1875
<i>Idaho.</i>								
Boise Barracks	50.1	19	46.4	- 3.7	56.5	1888	44.2	1883
Fort Sherman	46.2	9	42.2	- 4.0	50.9	1889	41.8	1882
<i>Indiana.</i>								
Lafayette	50.6	13	50.3	- 0.3	53.9	1886	45.4	1881
<i>Indian Territory.</i>								
Fort Supply	56.8	14	58.2	+ 1.4	61.6	1888	50.0	1874
<i>Iowa.</i>								
Cresco	43.3	21	39.6	- 3.7	47.3	1878	37.5	1874
<i>Kansas.</i>								
Eureka Ranch	54.7	10	52.6	- 2.1	58.6	1888	49.3	1892
Independence	57.6	21	58.1	+ 0.5	61.7	1878	48.3	1874
Salina	55.5	10	.....	.....	60.1	1889	49.0	1884
<i>Louisiana.</i>								
Grand Coteau	69.5	10	72.2	+ 2.7	72.2	1893	68.0	1891
<i>Maine.</i>								
Orono	40.0	23	.....	.....	45.1	1889	33.3	1874
<i>Maryland.</i>								
Cumberland	49.0	22	52.3	+ 3.3	57.6	1881	45.0	1874
<i>Michigan.</i>								
Kalamazoo	47.1	16	45.2	- 1.9	52.9	1878	42.0	1881
<i>Missouri.</i>								
Sedalia	56.7	10	54.4	- 2.3	61.5	1888	52.7	1885
<i>Montana.</i>								
Fort Custer	46.3	11	.....	.....	50.6	1889	42.1	1880
<i>Nebraska.</i>								
Fort Robinson	47.2	9	42.8	- 4.4	52.8	1888	41.6	1884
Genoa (near)	49.0	17	46.7	- 2.3	53.0	1890	42.2	1881
<i>Nevada.</i>								
Browns	55.2	22	49.3	- 5.9	63.4	1888	46.8	1883
Carson City	48.6	16	44.0	- 4.6	56.1	1881	43.1	1880
<i>New Hampshire.</i>								
Hanover	41.3	22	38.2	- 3.1	46.9	1887	33.7	1874
<i>New Mexico.</i>								
Fort Wingate	49.0	22	47.6	- 1.4	57.3	1881	39.2	1874
<i>New York.</i>								
Cooperstown	49.9	22	39.8	- 1.1	51.6	1878	33.6	1874
Plattsburg Barracks	41.4	22	37.6	- 3.8	47.9	1878	33.6	1874
<i>North Carolina.</i>								
Lenoir	55.7	20	59.6	+ 13.9	60.0	1887	42.6	1885
<i>Oklahoma.</i>								
Fort Reno	60.5	9	61.8	+ 1.3	64.3	1889	55.8	1884
Fort Sill	61.6	21	65.0	+ 3.4	65.5	1880	53.7	1874
<i>Oregon.</i>								
Bandon	49.3	9	.....	.....	52.5	1889	45.3	1886

Departures from normal temperature—Continued.

State and station.	(1) Normal for the month of April.	(2) Length of record.	(3) Mean for April, 1893.	(4) Departure from normal.	(5) Extreme monthly mean for April.			
					Highest.	Year.	Lowest.	Year.
<i>Pennsylvania.</i>	°	Years	°	°	°		°	
Dyberry	42.2	21	41.8	- 0.4	49.7	1878	35.0	1874
Grampian	43.4	22	44.3	+ 0.9	52.2	1878	29.0	1875
Wellsboro	43.7	14	40.1	- 3.6	52.2	1886	40.1	1881, 1893
<i>South Carolina.</i>								
Statesburg	62.2	12	67.4	+ 5.2	67.4	1893	60.1	1884
<i>South Dakota.</i>								
Fort Sully	46.8	21	42.4	- 4.4	55.5	1887	39.2	1875
<i>Texas.</i>								
Austin	70.7	20	75.8	+ 5.1	75.8	1893	63.1	1874
Silver Falls	61.6	7	66.1	+ 4.5	66.1	1893	59.4	1886
<i>Utah.</i>								
Terrace	52.8	20	46.9	- 5.9	62.5	1888	45.4	1882
<i>Vermont.</i>								
Stratford	40.8	20	35.8	- 5.0	48.3	1886	34.9	1874
<i>Virginia.</i>								
Dale Enterprise	53.7	13	55.1	+ 1.4	59.1	1886	51.6	1882
<i>Washington.</i>								
Fort Townsend	48.6	19	43.5	- 5.1	52.4	1889	43.5	1893
<i>West Virginia.</i>								
Parkersburg	54.0	12	55.5	+ 1.5	64.1	1882	43.0	1885
<i>Wisconsin.</i>								
Embarrass	44.2	22	.....	.....	54.9	1879	34.7	1874
Madison	44.5	21	42.4	- 2.1	52.5	1878	37.4	1874
<i>Wyoming.</i>								
Fort Washakie	42.7	10	36.8	- 5.9	46.6	1889	36.8	1893

TEMPERATURE, JANUARY TO APRIL, 1893.

For the period January 1 to April 30, 1893, the mean temperature averaged 2 to 4 below the normal in the middle Atlantic and New England states, the Ohio Valley and Tennessee, the Lake region, the upper Mississippi and Missouri valleys, the northeast and middle-eastern slopes of the Rocky Mountains, over the middle and northern plateau regions, and along the north and middle Pacific coasts, and was about 1 below the normal in the south Atlantic states and at Key West, Fla. In the extreme northwest and on the southeast slope of the Rocky Mountains the temperature averaged 1 to 2 above the normal. In the Gulf States, over the southern plateau region, and along the south Pacific coast the mean temperature averaged about normal for the period named.

YEARS OF HIGHEST MEAN TEMPERATURE FOR APRIL.

In the south Atlantic and Gulf states and eastern Tennessee the current month was the warmest April on record.

The highest mean temperature for April was noted in the Northwestern States and along the immediate Pacific coast in 1889; from the central valleys of California and the interior of Oregon over the middle plateau and middle Rocky Mountain regions in 1888; and from the middle and upper Mississippi valleys to the middle Atlantic coast and over the Lake region and western New England in 1878.

YEARS OF LOWEST MEAN TEMPERATURE FOR APRIL.

On the Pacific coast north of the 40th parallel, over the middle and northern plateau regions, in the Red River of the North and middle Missouri valleys, and on the southeast New England coast the current month was the coolest April on record.

In the Mississippi Valley and thence over the middle Atlantic and New England states the lowest mean temperature for April was noted in 1874.

MAXIMUM TEMPERATURE.

At stations in the south Atlantic states and Texas, and in the Mississippi, Ohio, and lower Missouri valleys, and the southwestern lake region the maximum temperature for the current month was the highest ever reported for April. The maximum temperature in the districts named was generally noted from the 6th to the 10th.

The highest temperature reported by a regular station of the Weather Bureau, 98, was noted at Wichita, Kans., on the

6th. 97 was registered at Concordia, Kans., Abilene and San Antonio, Tex., and 96 at Yuma, Ariz. At points in the south Atlantic states, the middle Mississippi and upper Ohio valleys, from eastern Kansas over Texas and in adjoining parts of western Arizona and southern California, the maximum readings were 90 or above. Voluntary observers in eastern Kansas, southeastern Texas, Oklahoma, southwestern Arizona, and southeastern California report maximum temperature above 100, the highest reading reported, 108, being noted at Twohig, Tex. The lowest maximum reading, 50, was noted at Saint Vincent, Minn., and the maximum temperature was below 60 on the Maine and southeast New England coasts, from Lake Superior over the Red River of the North Valley, and along the Washington coast.

MINIMUM TEMPERATURE.

At a number of stations in California the minimum temperature noted from the 6th to the 10th was the lowest ever reported for April.

The lowest temperature reported by a regular station of the Weather Bureau, 3 below zero, was registered at Saint Vincent, Minn., on the 14th. The minimum temperature fell below 10 over eastern Upper Michigan, in North Dakota and western Minnesota, and in an area covering the middle and northern Rocky Mountain regions. North of a line traced from the south New England coast, south of west to southwest New Mexico, thence northwestward to the Sierra Nevada Mountain range, and thence to northern Idaho, the minimum temperature was below 30. The highest minimum temperature, 65, was noted at Key West, Fla., and the minimum values were above 50 along the South Carolina, Georgia, Florida, and Gulf coasts.

LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather is shown on Chart V by a line traced from northern New Jersey south of west over the Ohio and middle Mississippi valleys and thence to southern Arizona, and the western limit of freezing weather is shown by this line continued northwestward over eastern California and central Oregon, thence eastward over the valley of the Columbia River, and thence to the northwest coast of Washington.

RANGES OF TEMPERATURE.

The greatest daily range of temperature is shown in the table of miscellaneous meteorological data. The greatest monthly range of temperature, 60 to 70, was noted in areas on the northeast and middle-eastern slopes of the Rocky Mountains, and in the lower Missouri valley. From those districts the monthly range decreased eastward to less than 30 on the southeast New England coast and to 30 at Hatteras, N. C., southeastward to 20 at Key West, Fla., and to 30 along the immediate Gulf coast, and westward to 20 at Fort Canby, Wash., and to 30 along the immediate middle Pacific coast.

COLD WAVES.

During the 1st a cold wave advanced from Manitoba over

the upper Mississippi valley and Lake Superior, with a fall in temperature of 20 to 30, and temperature below zero north of North Dakota and eastern Montana. During the 2d this cold wave overspread the Ohio Valley and the Lake region and reached New York and New England, with temperature below freezing. The morning of the 3d the temperature had fallen 20, and was 14 to 16 below the freezing point in Nova Scotia. A moderate cold wave advanced from the Northwest over the Lake region and New England from the 3d to the 5th. On the 5th the temperature fell 20 to 30 in the Northwest, and the morning of that date was 16 below zero at Prince Albert, N. W. T. On the 6th the temperature fell slightly from the upper Mississippi valley over the middle Atlantic and New England states, and the morning of the 7th a fall in temperature of 20 was noted at Lynchburg, Va., and the temperature was below freezing generally in New England.

On the 7th the temperature fell 30 to 40 in the Northwest. On the 8th this cold wave overspread districts between the southern lake region and northwestern Texas, and on the 9th caused a slight fall in temperature in the middle Atlantic and New England states. A cold wave appeared in the Missouri Valley on the 12th, advanced over the upper lake region during the 13th, with freezing temperature at Davenport, Iowa, in the morning; extended over the Ohio and lower Mississippi valleys on the 14th, with freezing weather to central Indiana, reached the Gulf and western parts of the south Atlantic states and Virginia on the 15th, and by the morning of the 16th caused a fall in temperature of 20 on the south Atlantic coast. No cold waves traversed the country east of the Mississippi after the 16th.

FROST.

The morning of the 7th heavy frost injured foliage and pear buds about Keeler, Cal. Fruit blossoms were damaged about Eureka and Pasadena, Cal., the morning of the 8th. Damage by frost was reported at Fresno and Keeler, Cal., the morning of the 13th. Fruit was reported injured by frost at Kearney, Nebr., and Albert, N. Mex., the morning of the 14th. On the 15th heavy frost injured fruit and tender vegetation in Oklahoma, eastern Kansas, and western and northern Missouri. Frost damaged fruit blossoms at points in Kentucky, Tennessee, and Ohio the morning of the 16th. Tender vegetation about Lenoir, N. C., was killed by frost on the 18th. Fruit about Montrose, Colo., was slightly damaged the morning of the 19th. Frost nipped fruit blooms and injured garden vegetables in northern New Mexico, Oklahoma, and southwestern Kansas on the 20th. Heavy frost was reported at points in southern Kansas and Missouri on the 21st. Considerable damage by frost was reported in eastern Tennessee and northeastern Alabama the morning of the 22d. The morning of the 23d frost injured tender vegetation from eastern Kansas over Missouri, Tennessee, and western North Carolina. On the 24th the frost line extended southward over the Atlantic coast states to northern Georgia. The morning of the 30th heavy frost was reported at Levan, Utah.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for April, 1893, as determined from reports of more than 2,000 stations, is exhibited on Chart III. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district

may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

In April the monthly precipitation is usually greatest along the Pacific coast north of the 40th parallel, and at points in the lower Mississippi valley, where it exceeds 8.00. It is 4.00 to 6.00 generally in the Gulf and south Atlantic states, Kentucky, Tennessee, and southern Missouri, on the southeast New England coast, and in central Utah. Over a large